LAKE COUNTY, ILLINOIS

CROSS LAKE 2010 SUMMARY REPORT

PREPARED BY

LAKE COUNTY HEALTH DEPARTMENT

POPULATION HEALTH ENVIRONMENTAL SERVICES

SPECIAL POINTS OF INTEREST:

- *Exotic Plants*
- *Volunteer Lakes Monitoring Program*
- *Threatened and Endangered Fish*

Cross Lake is a 89-acre glacial lake that crosses the political boundaries of Wisconsin (Kenosha County) and Illinois (County of Lake). Thirty percent of Cross Lake falls within Antioch Township, Lake County. The remaining 70% is located in Trevor, Wisconsin. The lake has two beaches that are open to Association members. The beach in Illinois is located in the Oakwood Knoll Subdivision and is open to association members. It became a licensed beach at the end of the season in 2010. There is no requirement for the beach to be a licensed beach in Wisconsin. Volunteers from both Wisconsin and Illinois participated in a Lake Monitoring Program. The data collected from these programs can assist in determining trends happening on the lake during times when agencies are not actively monitoring. The water quality of Cross Lake is very good. Most parameters measured remained constant on the lake since LCHD began monitoring the lake in 1999. According to a quantitative plant survey taken in July 2010 the vegetation was diverse with 15 species found. Two non native invasive species were detected in 2010, they were Curlyleaf Pondweed and Eurasian Water Milfoil.

INSIDE THIS ISSUE:

ENVIRONMENTAL SERVICES WATER QUALITY SPECIALISTS

Kathleen M. Paap
kpaap@lakecountyil.gov

Kelly Deem
kdeem@lakecountyil.gov

Leonard Dane
ldane@lakecountyil.gov

LAKE FACTS:

MAJOR TRIBUTARIES
FOX RIVER

WATERSHED
UPPER FOX RIVER

RECEIVING WATERBODY
TREVOR CREEK

VOLTZ LAKE (INTERMITTENTLY)

SURFACE AREA
89.0 ACRES

SHORELINE LENGTH
2.11 MILES

MAX DEPTH
35.7 FT. (ESTIMATE)

AVERAGE DEPTH
17.9 FT (ESTIMATE)

LAKE VOLUME:
1593 ACRE-FEET

LAKE TYPE:
GLACIAL

BOTTOM OWNERSHIP
WDNR

OAKWOOD KNOLLS SUBDIVISION

INDIVIDUAL HOMEOWNERS

MANAGEMENT ENTITY
CROSS LAKE IMPROVEMENT ASSOCIATION

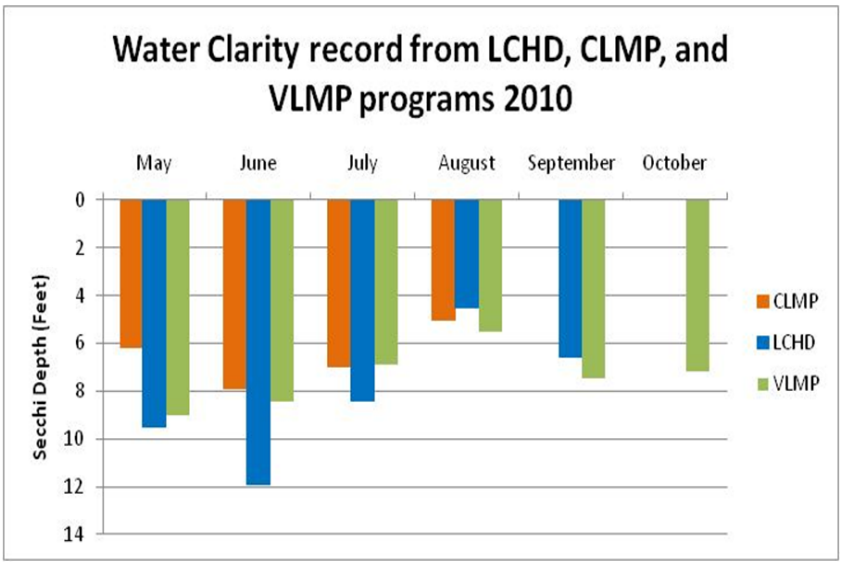
OAKWOOD KNOWLLS HOMEOWNERS ASSOCIATION

FRIENDS OF CROSS LAKE

CURRENT AND HISTORICAL USES
BOATING, SWIMMING AND FISHING

ACCESS
PRIVATE

WATER CLARITY AND TOTAL SUSPENDED SOLIDS (TSS)



LCHD sampled for water quality parameters once a month at the deepest point of Cross Lake from May through September 2010 (Appendix, Figure 1). Water clarity was measured monthly by the LCHD using Secchi depths (Appendix, Table 1). In 2010, concurrently with LCHD, two volunteer lake monitors, one from Wisconsin (CLMP) and the other from Illinois (VLMP) monitored Secchi depths on Cross Lake . The figure above shows the results of the water clarity measurements in Cross Lake during 2010.. The Secchi depths were not measured on the same dates with the exception of July 15 by the CLMP and VLMP volunteers. The CLMP took measurements bi-weekly and the monthly averages are what is presented above. During the monitoring period May through August Secchi depths measured by the CLMP ranged from 4.5 ft (May) to 9.0 ft (June).

The VLMP took measurements monthly from May through October. There were two measurements taken in May and those measurements were averaged similar to the CLMP data. Otherwise data is presented based on actual readings. Secchi depths taken by VLMP ranged from 5.5 ft (August) to 10.4 ft in May.

LCHD measurements were conducted monthly so only actual measurements are presented. Secchi depths ranged from 4.5 ft in August to 11.9 ft in June.

The median Secchi depth from 758 measurements taken between 2000 to 2010 from lakes within Lake County was 2.95 ft (Appendix Table 2). The minimum Secchi depth found on Cross Lake was 4.5 feet, with seasonal average measured by LCHD calculated at 8.18 ft. Cross Lake ranked 21 of 158 lakes with Secchi depths measured in Lake County (Appendix Table 3).

Total Suspended Solids (TSS) is the total sum of non-volatile (sediments), volatile (plant, animal), and dissolved solids (chemical). TSS is inversely correlated to water clarity, therefore when water clarity decreases there is a rise in TSS. TSS has continually increased since LCHDES began monitoring Cross Lake in 1999 (Appendix Table 1). During 2010 we measured a 25.7 % increase in average TSS concentration when compared to that of 2006. Interestingly, most of the parameters that would be related to an increase in TSS have decreased.

NUTRIENTS

Cross Lake is considered mesotrophic. Mesotrophic lakes are biologically productive, having moderate nutrient levels and some plant growth. The Trophic State Index based on phosphorus (TSIp) for Cross Lake (49.52) indicates that the lake is inching towards becoming eutrophic (high nutrient) as the TSIp has increased since 2003 (48.7). A lake is considered eutrophic when its TSI score is 50 or greater.

Total phosphorus (TP) concentrations in Cross Lake ranged from 0.017 mg/L to 0.033 mg/L. This is below the IEPA standard of 0.05 mg/L , above this standard waters are considered impaired for phosphorus. Although at this time phosphorus in not a problem in Cross Lake, care should be taken to ensure that phosphorus inputs are minimized by initiating practices that minimize nutrient loading into the lake from the lakes watershed. A Total Nitrogen:Total Phosphorus (TN:TP) ratio of 37:1 indicates that plant and algal growth remains limited by phosphorus. Therefore any additional sources of phosphorus entering into Cross Lake could tip the ecological balance of the lake. In 2010 the aquatic vegetation in Cross Lake is diverse and balanced. However, the TN:TP ratio has continually decreased since the LCHD-ES began monitoring in 1999 dropping from 47:1 in 2006 to its current ratio (37:1). The consequences of this could mean algal blooms on Cross Lake in the future as either of the nutrients responsible for plant/algal growth become plentiful.

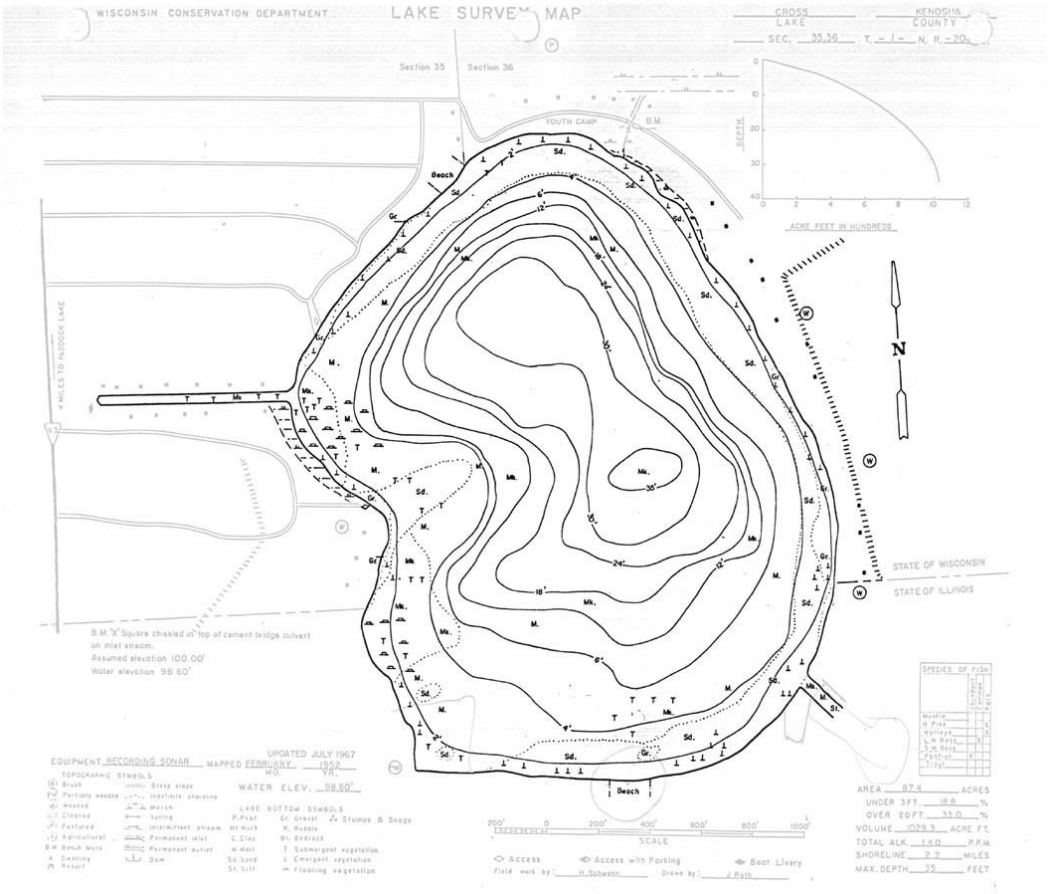
In 2010, nitrogen concentrations in the form of nitrate-nitrite increased from those measured in the past, however, they too are not at levels of concern. TKN which is a good indicator of total nitrogen in the water decreased to 0.74 mg/L, this concentration is similar to what was reported back in 1999 (0.72 mg/L).

Cross Lake ranks 16th out of 165 lakes in the county monitored between the period of 2000-2010 for TSIp (Appendix Table 4). This is a very good ranking for Cross Lake, however, Cross Lake has moved down the list from the 2005 ranking table when it was ranked 9th of 156 lakes sampled at that time.

One positive step towards removing a source of phosphorus is an ordinance by the Village of Antioch banning the use of lawn fertilizers which contain phosphorus and the statewide ban in Wisconsin.

Remediating eroding shoreline areas would be another step that could be taken in order to prevent phosphorus from entering Cross Lake. Phosphorus binds to sediments. There are many options available to repair eroding shorelines, these are outlined in Appendix C.

DISSOLVED OXYGEN (DO)



Dissolved oxygen (DO) concentrations in Cross Lake averaged 8.77 mg/L at 3 feet and 2.0 mg/L between 31 and 33 feet or 3 feet from the lake bottom during our visits (Appendix Table 5). Cross Lake was thermally stratified during our entire monitoring period in 2010. Stratification occurred between 32 feet in May and 8 feet in August. This a normal phenomenon in deep glacial lakes similar to Cross Lake and is not a concern at this time.

Cross Lake did experience anoxic conditions ranging between near bottom during May and June extending to approximately 15 foot depth in August. Under anaerobic conditions, phosphorus releases from bottom sediments into the water column becoming a source of phosphorus entering a lake.

There is not a current bathymetric map available in order to calculate the volume of Cross Lake that was anoxic . There is an out-dated bathymetric map that was completed by the Wisconsin Department of Natural Resources in 1952 and updated in 1967. LCHD-ES recommends that bathymetric maps be updated every 10 years. Bathymetric maps and their corresponding morphometric data are useful tools for assisting lake managers make decisions about their lake such as fish habitat, plant management etc.

SUBMERGED AQUATIC VEGETATION

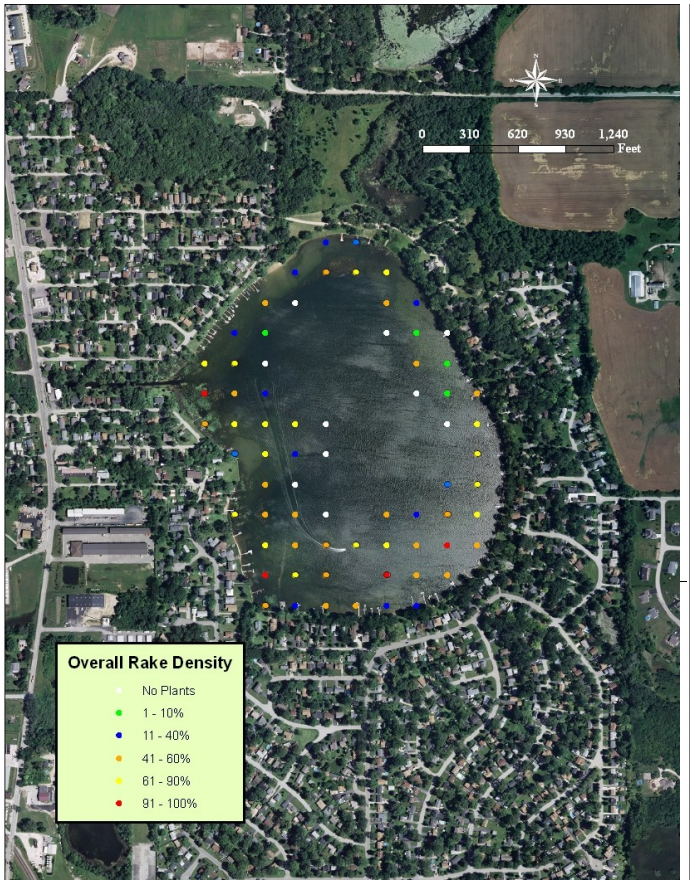


Figure 3A. Rake density of aquatic vegetation in Cross Lake, 2010

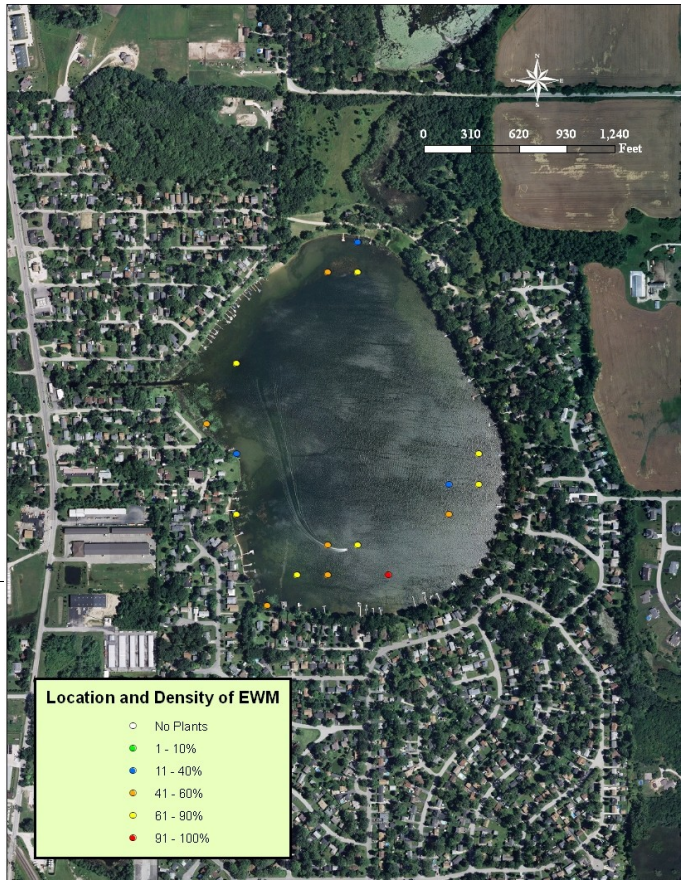


Figure 3B. Rake density and location of EWM in Cross Lake, 2010

Total Average Cover and Frequency of Dominant Plants in Cross Lake 2010.		
Species	Average Cover	Frequency
Chara	24.60	54.17
Coontail	10.63	25.00
Illinois Pondweed	6.02	30.56
Total Average Cover	67.18	

In 2010, a total of 14 species plus Chara, a macro algae was detected during a comprehensive survey completed in July, 2010 on Cross Lake (Appendix Table 6A). Table 6B and Figure 3A indicates the distribution of plants across all sampling sites. The total average cover was 67.18%. This is based only upon the area of the lake where plants are able to establish and is based upon light level and depth. Total average cover becomes important when making management decisions and depending on goals of a lake can be different. For instance, if a lake supports a sport fishery, it is recommended that the total average cover by plants be 40%.

Dominant species in Cross Lake in 2010 were Chara, Coontail and Illinois Pondweed. Eurasian Water Milfoil an invasive exotic was found at 25% of the sites sampled in 2010 (Table 6A) and contributed to approximately 5% of total average cover. Figure 3B shows the locations and density by which it was found. Curlyleaf pondweed

SUBMERGED AQUATIC VEGETATION

was also detected in the 2010 survey but remained a minor component of the plant community.

Four species that were found throughout 2003 and were not detected in July of 2010, were Horned Pondweed, Spiny Naiad, White Water Crowfoot, and Northern Milfoil. However, Elodea which was not detected in 2003 was found in 2010.

A Floristic Quality Index was generated for Cross Lake at 22.4 and ranks Cross Lake 27th out of 154 lakes within Lake County that have had floristic quality indices calculated (Appendix Table 7).

LCHD-ES encourages all associations charged with plant management to work together on a comprehensive plant management program as there are T&E fish present in Cross Lake. All of these fish species depend on abundant aquatic vegetation and good water quality to sustain their populations.

SHORELINE EROSION

In August 2010 the shoreline was assessed for degree of erosion. Sixty-seven percent of the shoreline was observed to have some degree of erosion. Forty-eight percent of the erosion found on Cross Lake shoreline was considered slight (Figure 5). The remaining 19% of shoreline shows moderate (11%) to severe (8%). Remediating erosion conditions when they are slight is much easier than when conditions worsen. LCHD-ES recommends stabilizing the eroded shorelines. There are different methods for accomplishing this, one that is preferred is to stabilize the shoreline using native plantings. It is highly recommended that shoreline areas with severe erosion be repaired as they can be a source of phosphorus entering into the lake as phosphorus binds to sediments, once in the lake and under the proper conditions (anoxia) the phosphorus can be released into the waters. Sediments as well as nutrients can increase turbidity in Cross Lake, turbidity has been found to negatively impact T&E fish that depend on good water quality.

Figure 5. Degrees of shoreline erosion on Cross Lake.

Fish

In years past, Cross Lake has been home to several state threatened and endangered fish species. However, our records indicate that there has not been a fish survey conducted since 2003. At that time, a seining survey took place at three locations on Cross Lake; fourteen species were captured during the seining event. Four state threatened and endangered species were found, they were: banded killifish, pugnose shiner, blackchin shiner and blacknose shiner. In 1998 during a seine sampling conducted by the Illinois Natural History Survey, Iowa darter was collected but pugnose shiner was not. A survey conducted by the Illinois Department of Conservation currently the Illinois Department of Natural Resources, did not detect any of these species likely due to the method of sampling used at that time.

A list of the lakes containing T&E fish species is presented to the right. Because of the likely presence of these species in Cross lake, care should be exercised when implementing any form of management in the lake.

While it is recommended that management of Eurasian Water Milfoil be executed, it is important to stress that these T&E fish depend on dense aquatic plant beds for habitat. Over management of the aquatic plant populations is a concern as loss of habitat could occur as well as a decline in water quality (turbidity), and this would impact these species negatively.

Monitoring the fish populations and aquatic plant densities is recommended as all of these species are dependent on both abundant aquatic vegetation and their populations show declines with increased turbidity.

Table Lake County lakes with T&E fish Species

Pugnose shiner
Cross Lake (2003)
Deep Lake (2002)
East Loon Lake 1990)
West Loon Lake (1990)

Banded Killifish
Bangs lake(2009)
Cedar lake (2001)
Cross lake (2003)
Deep lake (2002)
East loon lake (2009)
West Loon Lake (2009)

Blacknose shiner
Bangs lake (2009)
Cedar lake (2003)
Cross lake (2003)
Deep lake (2002)
East loonlake (1998)
Little silver lake (2003)
West loon lake (2009)
Wooster lake (2004)

Blackchin shiner
Bangs lake (2009)
Cedar lake (1997)
Cross lake (2003)
Deep lake (2002)
East loon (2009)
Gray's lake (1989)
Lake Catherine (1997)
Little silver lake (2003)
Petite lake (2006)
West loon lake (2009)
Wooster lake (2004)

Iowa darter
Bangs Lake (2009)
Cedar lake (1998)
Cross lake (1998)
Deep lake (2002)
East loon lake (1998)
Highland Lake (2005)
Lake Zurich (1993)
Old school lake (1997)
Sullivan lake (2003)
Timber lake (2003)
Round lake (1988)
Third lake (2003)
Turner lake (2002)
Wooster lake (2002)
West loon lake (2009)

Life History - Blacknose Shiner

Description

Blacknose shiners have black pigment on the tip of the snout and upper jaw and none on the lower jaw which is white. This pigment is the beginning of a black stripe that runs through the eye, across the gills, and along the side to the base of the tail. The scales on the back and upper sides have distinct dark edges. There is a narrow stripe of golden colored scales that lack any dark edges just above the black stripe along the sides that sharply contrasts with the back and stripe. Blacknose shiners have an incomplete lateral line with a dusky bar at the rear edge of the scales along the black stripe on the sides. The snout overhangs the lower jaw of the rather small and slightly sub-terminal (ending below tip of snout) mouth. All fins are transparent and they have 8 anal fin rays. The blacknose shiner differs from the closely associated blackchin shiner in having a smaller mouth and no pigment on the lower jaw.

Habitat and Habits

Blacknose shiners are found in some of Lake County's glacial lakes that have clear water and abundant vegetation and elsewhere in Illinois in certain clear streams located in extensive sand areas. This species quickly disappears when waters become turbid (murky) and the substrate silted over with clay.

Reproduction and Care of the Young

Blacknose shiners spawn in June or July by scattering eggs over vegetation. The eggs hatch in a few days and no further parental care is given.

LakeCounty
Health Department and
Community Health Center

ENVIRONMENTAL SERVICES

Senior Biologist: Mike Adam

madam@lakecountyil.gov

Population Health Services
500 W. Winchester Road
Libertyville, Illinois 60048-1331

Phone: 847-377-8030
Fax: 847-984-5622

For more information visit us at:

http://www.lakecountyil.gov/Health/want/BeachLakeInfo.htm

Protecting the quality of our lakes is an increasing concern of Lake County residents. Each lake is a valuable resource that must be properly managed if it is to be enjoyed by future generations. To assist with this endeavor, Population Health Environmental Services provides technical expertise essential to the management and protection of Lake County surface waters.

Environmental Service's goal is to monitor the quality of the county's surface water in order to:

- Maintain or improve water quality and alleviate nuisance conditions
- Promote healthy and safe lake conditions
- Protect and improve ecological diversity

Services provided are either of a technical or educational nature and are provided by a professional staff of scientists to government agencies (county, township and municipal), lake property owners' associations and private individuals on all bodies of water within Lake County.

RECOMMENDATIONS

Cross Lake has above average water quality. Total Phosphorus and Total Suspended Solids, two water quality parameters for which many of our lakes are impaired, are well below county averages. Water clarity surpasses most of our lakes. Some suggestions for maintaining the excellent water quality and habitat conditions in Cross Lake are:

- Remediation of eroding shorelines.
- Continue VLMP monitoring water chemistry such as TSS, phosphorus and nitrogen.
- Conduct a fish survey, including seining is recommended to assess fish and T&E fish populations.
- Update Bathymetric map of Cross Lake
- Exotic Plant Management

LAKE MONITORING
VOLUNTEER PROGRAM
ILLINOIS